Bendix® BA-921® Compressor

Complete one Compressor Installation and Application Review Form for each fleet installation arrangement (vehicle type/engine combination) and send to:

Bendix Commercial Vehicle Systems LLC
Attn: Hans Burkhardt – Product Engineer
Cc: Mark McCollough – Engineering Manager
901 Cleveland Street
Elyria, Ohio 44035

Note: Measurements should be made with commercial grade instruments with tolerances of 3% max.

CAUTION: When working on vehicles and/or carrying out testing procedures, always follow standard industry safety guidelines, including the use of adequate eye protection, etc.

Compressor Part Number: _____

Compressor Serial Number: _____

Vehicle Make and Model: _____

Engine Make and Model: _____

Engine Serial/Unit Number: _____

Submitted By: _____

Employed By: _____

Date Submitted: _____

The following items should accompany this form:

- Attach any available air system schematic
- Attach available technical information for associated components
- Attach photos of the compressor installation
- Attach photos of the compressor air inlet hose arrangement
- Attach photos of the compressor governor arrangement
- Attach photos of any devices in the discharge line
- Attach photos of the air dryer

Section I Application Information

Check the boxes that best apply and use the comments space to further clarify:

On-Highway and Linehaul ☐
- Straight truck ☐
- Single trailer ☐
- Double trailer ☐
- Triple trailer ☐
- Motor coach ☐
- RV ☐
- Other : _____

Vocational ☐
- Delivery ☐
- Dumper/Mixer ☐
- Terminal Jockey ☐
- Bulk Unloader ☐
- Transit Bus ☐
- Crash/Fire/Rescue ☐
- Other : ☐

Off-Highway and Military ☐
- Description:

Section II Vehicle Features Requiring Air

Check the boxes that best apply and use the comments space to further clarify:

Air brakes ☐

Multiple Axles ☐

Number of axles: _____

Air suspension ☐
Description:

_____
_____
_____

Bulk Unloading ☐

Typical time to unload: _____

Frequency of unloading events: _____

Central Tire Inflation ☐
Description:

_____
_____
_____

Kneeling capability (bus feature) ☐

Doors or windshield wipers ☐

Air park or door interlock ☐

Lift Axles ☐
Description:

_____
_____
_____

Other:
Description:

_____
_____
_____
_____

Section III Vehicle/Engine Requirements and Expectations

Life expectation (in hours or miles): _____

Duty Cycle expectation (percent time compressor operates loaded):

☐ 5% to 25%
☐ greater than 25%

Duty cycle is considered the percentage of time that the compressor is operated in the loaded (pumping) condition. To calculate duty cycle, the total loaded time is divided by the total operating time of the compressor.

Maximum charge time should not exceed 90 seconds.

Charge duration is the amount of time the compressor runs continuously. Discharge temperature rises while the compressor is loaded so the longer the compressor runs the higher the discharge temperatures. Keeping the charge times low helps to minimize discharge temperatures, hence, reducing carbon formation. In addition, the air dryer can only process a limited amount of air before requiring a purge cycle. Minimizing the charge time reduces the burden on the air dryer.

Recommended Test Procedure:

Note: The test conditions should be indicative of worse case conditions for the vehicle's vocation (i.e highway use versus city use).

Install a pressure switch (60 - 90 psi) in the governor signal line. Record the switch voltage or continuity during vehicle operation. The duty cycle is the quotient of the compressor loaded time (low pressure in the signal line) and the total time. Alternate methods to measure the duty of the vehicle can be utilized; for example, a pressure transducer installed at the unloader port of the air dryer with a data logger to collect the data.

The duration of the test should reflect the typical operating cycle of the vehicle. The duration of the vehicle test should be 1 to 3 days minimum. For vocation that exhibit large amounts of braking (i.e. city use); one day is adequate. Under conditions with less braking (i.e. highway use), the duration should last at least 3 days.

Was duty cycle measured? NO ☐

YES ☐ Measured value: _____%

Average charge time during test _____

Maximum charge time during test _____

Section III Vehicle/Engine Requirements and Expectations (cont'd)

Installation angles:

Engine installation angle: _____

Compressor rotated angle: _____

Gradability (vehicle operation on slope):

Side: _____

For/Aft: _____

Percent of time operated on inclines: _____

Compressor delivery/system pressure: _____

Engine Rated Speed: _____

Air compressor drive ratio: _____

Section III Vehicle/Engine Requirements and Expectations (cont'd)

Compressor Thru-drive:

Pump Drive (For new applications refer to Bendix Application Guideline BW-100-A, BW-132-A or Compressor Customer Drawing)

Thru-drive to be used for: _____

Installed pump: _____

Vendor/PN: _____

Operating torque: _____

Operating HP: _____

Worst-case torque (consider spikes and cold operation): _____

Worst-case HP (consider spikes and cold operation): _____

Describe pump/motor control system:

_____
_____
_____
_____

Comments:

_____
_____
_____
_____

Section IV Air System Components

Compressor Air Induction System - Naturally Aspirated Compressor Applications Only

Inlet Line

Filter source

☐ Engine Air Filter

Allowable engine air inlet restriction (see the engine manufacturer's engine data sheet):

Clean _____

Dirty _____

Recommended Test Procedure

Install a water manometer (gauge) to read the pressure at the air inlet fitting on the compressor. If the compressor shares the engine air intake system then restrict the engine air filter such that at rated engine power and speed the engine is at its maximum allowable inlet restriction for a dirty filter (see the engine data sheet). Under this condition operate the engine at rated speed and power and read the pressure at the compressor air inlet fitting while the compressor is loaded/pumping.

Measured compressor air inlet restriction:
(measured at compressor at rated engine speed and power with a dirty filter.)

_____

☐ Dedicated air compressor filter

Description:

_____
_____
_____
_____

Measured compressor air inlet restriction:
(measured at compressor at rated engine speed and power with a dirty filter.)

_____

Section IV Air System Components (cont'd)

Compressor Air Induction System - Naturally Aspirated Compressor Applications Only (Cont'd)

Line size _____

Line length _____

Expected/Measured Worst-Case Inlet Air Temperature: _____

Was measured restriction less than 25 in H_2O? YES ☐ NO ☐

Is the inlet air temperature greater than 170°F? YES ☐ NO ☐

Recommended Test Procedure:
Install a temperature probe in the air compressor inlet hose or fitting as close to the compressor as possible. Operate the vehicle such that the engine is at operating temperature and the compressor is loaded/pumping. Record the compressor air inlet temperature and note the ambient temperature. To obtain the maximum air inlet temperature, add the difference between the recorded inlet temperature and the noted ambient temperature to the maximum expected ambient temperature.

Was the restriction measured per the recommended procedure? YES ☐ NO ☐

If no, describe the procedure used: _____
_____
_____
_____

Section IV Air System Components (Cont'd)

Compressor Air Induction System - Turbocharged Compressor Applications Only
(NOTE: Testing should be performed by the engine Manufacturer)

Compressor Inlet Line

The compressor inlet line will run from the pressurized side of the engine intake system (i.e. intake manifold) to the compressor inlet port.

Inlet line size _____

Inlet line length _____

Devices/Components (if any) in the air induction system. Describe system:
_____
_____
_____

Expected/Measured Worst Case Compressor Inlet Air Temperature: _____
_____

Recommended Test Procedure to Measure Max Compressor Inlet Temperature:
Install a temperature probe in the air compressor inlet hose or fitting as close to the compressor as possible. Operate the vehicle such that the engine is at operating temperature at conditions resulting in maximum inlet air temperature (i.e. engine load, RPM, etc). Record the compressor air inlet temperature and note the ambient temperature.

Ambient temperature during test: _____

Is the maximum inlet air temperature greater than 250°F? YES ☐ NO ☐

Maximum boost pressure @ XXXX engine rpm _____
(Supply maximum boost vs engine RPM curves)

Section IV Air System Components (Cont'd)

Compressor Air Induction System - Turbocharged Compressor Applications Only (Cont'd)
(NOTE: Testing should be performed by the engine Manufacturer)

Expected/Measured Minimum Compressor Inlet Pressure / Vacuum
(measured at compressor at rated engine speed and no engine load.)

_____

Note: If it can be verified that positive boost pressure is available at operating temperatures with no engine load, no test will be required.

Recommended Test Procedure to Measure Min. Compressor Inlet Pressure/Vacuum:
Install an appropriate pressure measurement device at the air inlet fitting on the compressor. Bring the engine up to operating temperature. Run the engine under a no load condition at rated engine speed and the compressor in the loaded (compressor pumping) condition. Record the minimum compressor inlet pressure or vacuum.

Was measured compressor inlet pressure less than 25 in H_2O? YES ☐ NO ☐

Section IV **Air System Components (cont'd)**

Discharge line

First component after compressor (filters, separators, traps, dryers)

What: _____

Line size to: _____

Distance to: _____

Second component after compressor (filters, separators, traps, dryers)

What: _____

Line size to: _____

Distance to: _____

Third component after compressor (filters, separators, traps, dryers)

What: _____

Line size to: _____

Distance to: _____

Is the discharge piping routed in a downhill manner to the air dryer?

YES ☐ NO ☐

Measured compressor discharge pressure
(measured at the compressor) _____

Recommended Test Procedure:
Install a pressure gauge at the discharge fitting of the compressor and record the discharge pressure at the time of governor cut-out with engine at rated speed.

Was measured discharge pressure greater than 170 psi? YES ☐ NO ☐

Section IV Air System Components (cont'd)

Total Reservoir Volume _____

Charge time required to raise the reservoir pressure from governor cut-in to cut-out at maximum rated engine speed. _____

Recommended Test Procedure:
Drain down the entire air system (supply, service and accessory tanks) to below 75 psi. As the compressor runs to charge up the air system, start a timer when the tank pressure reaches the governor cut-in pressure. Stop the timer when the compressor cut out (dryer purge can usually be heard).

Was measured charge time less than 90 seconds? YES ☐ NO ☐

Coolant Supply

Source: _____

Line size to: _____

Distance to: _____

Maximum allowable engine coolant temperature: _____

Maximum expected compressor coolant temperature: _____

Recommended Test Procedure:
Install a temperature probe in the coolant supply fitting on the compressor and either monitor or measure the engine coolant temperature (at thermostat housing). Operate the vehicle such that the engine reaches operating temperature. Record the engine coolant temperature and the compressor coolant supply temperature. The maximum expected compressor coolant temperature is sum of the recorded compressor coolant temperature and the difference between the recorded engine coolant temperature and the maximum allowable engine coolant temperature.

Is the maximum expected coolant supply temperature less than 220°F?
YES ☐ NO ☐

Section IV Air System Components (cont'd)

Coolant Return

Return Port Location: _____

Line size to: _____

Distance to: _____

Measured coolant flow rate

At engine idle: _____

At engine rated speed: _____

Recommended Test Procedure:
Install a flow meter in series with the coolant supply or return line of the air compressor. Note the flow rate through the compressor when the engine thermostats are open at engine idle and rated speed.

Was measured flow rate greater than .4 gpm at idle and 1.4 gpm at rated speed?

YES ☐ NO ☐

Measured Coolant Pressure Drop - Alternative measurement method. (Pressure drop across compressor coolant inlet and outlet ports)

At engine idle: _____

At engine rated speed: _____

Recommended Test Procedure:
Install a pressure gauges at the coolant inlet and outlet fittings of the air compressor. Record the pressures (or pressure differential) at engine idle and engine maximum rated speed.

Was the measured pressure drop greater than 0.8 psi at idle and 1.6 psi at maximum rated speed?

YES ☐ NO ☐

Section IV Air System Components (cont'd)

Compressor Oil Supply

Source: _____

Line size to: _____

Distance to: _____

Compressor Oil Return

☐ Return through front flange

☐ Return through bottom drain only

☐ Return through both bottom drain and front flange

Measured Oil Supply Pressure (record at compressor fitting at engine idle):

_____

Recommended Test Procedure:
Install a pressure gauge at the oil fitting on the air compressor. Record the oil pressure at engine idle with the engine at normal operating temperature.

Was measured oil supply pressure greater than 14.0 psi ? YES ☐ NO ☐

Describe any auxiliary fittings at the oil supply of the compressor: _____
_____
_____
_____

Section IV Air System Components (cont'd)

Governor location

- ☐ Compressor mounted
- ☐ Air Dryer Mounted
- ☐ Remote

Compressor control

☐ Governor for Compressor Unloader

Governor part number and/or vendor: _____

Cut out pressure: _____

Range or band: _____

☐ Governor with discharge line unloading

Governor part number and/or vendor: _____

Cut out pressure: _____

Range or band: _____

Governor air signal line size/length: _____

Governor air control line size/length: _____

Section IV Air System Components (cont'd)

Air Dryer

Air Dryer part number and/or vendor: _____

Maximum allowable temperature to the dryer: 160^0F
(Bendix Air Dryers Requirement)

Minimum allowable temperature to the dryer: 45^0F above lowest ambient
(Bendix Air Dryer Requirement)

Recommended Test Procedure:
Install a temperature probe at the air dryer inlet fitting. Operate the vehicle such that the engine is at operating temperature. Drain an air tank such that the compressor runs continuously, but the pressure remains about 10 psi below the governor cut-out pressure. Note the dryer air inlet temperature after the compressor has run for 90 seconds with the engine running at rated speed. Also note the ambient temperature. To obtain the maximum air inlet temperature, add the difference between the recorded inlet temperature and the noted ambient temperature to the maximum expected ambient temperature. Likewise, add the temperature difference to the minimum expected ambient temperature.

Measured inlet temperature to the dryer: _____

Ambient temperature at time of measurement: _____

What is the maximum expected ambient temperature? _____

What is the minimum expected ambient temperature? _____

What is the maximum expected dryer inlet temperature? _____

What is the minimum expected dryer inlet temperature? _____

COMMENTS

BENDIX ENGINEERING USE ONLY

Does the compressor installation meet all Bendix Commercial Vehicle Systems requirements?

☐ YES ☐ NO

(See BW-132-A, BW-110-A, BW-109-A and BW-100-A for complete application and installation requirements.)

ACCEPTED? ☐ YES ☐ NO

APPROVED BY: _____ (Engineer) DATE: _____

APPROVED BY: _____ (Manager) DATE: _____

COMMENTS / EXCEPTIONS:

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